产品规格书

Product specification

并离网无缝切换开关

Seamless-switching switch

for grid-tied and off-grid

产品型号 Part Number：KSiC1

版　　本 Revision：F1.1

目　录 Contents

一、适用范围与用途 Scope of application and purpose

KSiC1 产品为混合固态并离网无缝切换开关，其融合了低压电器快速电磁驱动技术以及半导体固态灭弧等相关技术。产品具备分闸速度快，分闸时间稳定离散性低，产品可靠性高等特点，主要用于光伏储能系统。

The KSiC1 product is a hybrid solid-state and off-grid seamless switching switch, which integrates the rapid electromagnetic driving technology of low-voltage electrical appliances and related technologies such as semiconductor solid-state arc extinction. The product features fast disconnect speed, stable and low-discrepancy disconnect time, high product reliability, etc. It is mainly used for photovoltaic energy storage systems.

二、产品外观 Product appearance

图 1. 产品图片(图片仅供参考，具体以实物为准)

Fig.1 Product shape (The pictures are for reference only, please refer to the actual product for details)

三、规格型号说明 Specification and model description

KS 1 iC 2 1 3 - □ 4 / □ 5 □ 6 / □ 7

序号 No.	序号名称 Name	KSiC1
1	企业代号 Enterprise code	KS:KingSi
2	产品代号 Product code	iC: 快速切换开关 off-grid seamless switching switch

3	设计代号 Design generation	1
4	壳架代码 Frame code	630：630A、250:250A
5	极数 Pole	4:4P、3:3P
6	应用类型 Application Type	无 None：单机 Single x2:并联型 parallel S:互锁型 interlock
7	产品号[注 note1]Product number	无 None:双干接点控制 dual dry contact control D: 单干接点控制 single dry contact control

注 1：互锁型不涉及单双节点。

Note 1: Interlocking type does not involve single or dual dry contact control

四、技术参数 Technical parameters

4.1 主开关参数 Main Switch Parameters

壳架电流 Frame current	630A
额定工作电流（Ie） Rated Working Current	250A、630A [注 note1] 、1260A（并联 parallel）[注 note2]
额定绝缘电压 Rated Insulation Voltage	AC800V
额定冲击耐受电压 Rated impact withstand voltage	6kV
工频耐压 Industrial frequency withstand voltage	2500V/5s [注 note 3]
额定工作电压(Ue) Rated Working Voltage	AC380/400/415V、AC440/480V [注 note 4]
工作电压范围 Working Voltage Range	65%~135% （Ue=AC 380V）
额定工作电压频率 Rated Working Voltage Frequency	50/60Hz
极数 Pole	4P、3P(4P 外形 frame)
单极内阻 Single-Pole Internal Resistance	<0.1mΩ
远程分闸输入信号 Remote opening Input Signal	干接点脉冲信号 Dry contact pulse signal （脉冲信号不适用于互锁模式 Pulse signals are not suitable for interlocking mode）
远程合闸输入信号 Remote closing input signal	干接点脉冲信号 Dry contact pulse signal （脉冲信号不适用于互锁模式 Pulse signals are not suitable for interlocking mode）
分闸时间[注 5] Opening time[note 5]	≤16ms
合闸时间	≤20ms

Closing Time	
电气寿命 Electrical durability	20000
机械寿命 Mechanical durability	20000
额定限制短路限流 Rated Short-Circuit Current Limiting（Iq）	10kA（与塑壳断路器配合 with circuit breaker）
短时过载耐受能力 Short-time overload tolerance capability	1.5Ie/20min 2Ie/10min 5Ie/10s
使用类别 Utilization category	AC-1:630A AC-3:125A
特殊接通分断能力 Special Making and Breaking Capability	接通能力 Making capacity：10Ie 分断能力 Breaking capability：2Ie
供电方式 Power Supply Mode	1、双路 24V：由 2 路功率 60W 电源输入； Dual 24V: Input from two 60W power sources （一路从输入侧取电，一路从输出侧取电，推荐外部辅助电源模块型号：明纬 WDR-60-24 One path takes power from the input side, and another from the output side. Recommended external auxiliary power module model: Mingwei WDR-60-24） 2、单路 24V: 功率：120W；推荐外部辅助电源模块型号：明纬 EDR-120-24，从 UPS 取电。 Single input 24V: 120W. Recommended external auxiliary power module model: Mingwei EDR-120-24, Pull power from UPS。 * 用户自选外部辅助电源的负载调整率需小于 1% The load adjustment rate of the external auxiliary power supply selected by the user needs to be less than 1%.
延时分闸 Delay opening	掉电延时分闸 Power-off Delay Time Opening 注 note 6
是否具备隔离断点 Isolation breakpoint	是 Have
通讯方式或协议 Communication method or protocol	RS485（加强绝缘 reinforced insulation） CAN（加强绝缘 reinforced insulation）
双电源转换 Transfer Switch of two power	两台开关电气互锁实现两路电源转换 Two switches are electrically interlocked to realize the transfer of two power supplies.
并机使用 parallel	产品最多支持 2 台并联使用 The product supports up to two parallel devices for use
安装方式 Installation method	螺钉底板 Screw Base Installation
接线方式 Connection Mo	板前 Installation in front of the board
操作 Operating	远程：干接点/通讯 Remote: dry contact/communication 本地：合分闸电动按钮

	Local: Electric button for closing and opening the switch
分合闸指示 Opening and closing indication	有 Have
符合标准 Meeting standard	GB14048.1、GB/T14048.4、IEC60947-1、IEC60947-4-1
证书 Certificate	CCC、CE、CB
工作温度范围 Working temperature range (℃)	-30~+75℃
存储温度范围 Storage Temperature Range (℃)	-40~+85℃
相对湿度 Relative humidity	≤95%
IP 等级 Ingress Protection	IP20

注 1：630A 为垂直安装下额定工作电流，如水平安装，需降额到 400A 使用。

Note 1: The rated working current of 630 A is for vertical installation; if installed horizontally, it should be derated to 400 A for use.

注 2：产品双机并联后工作电流降容系数为 85%，即工作电流为 1260A*0.85=1071A。

Note 2: After the product is connected in parallel with two machines, the working current derating factor is 85%, which means the working current is 1260A * 0.85 = 1071A.

注 3：本产品出厂前已进行相应绝缘测试，禁止在相间进行耐压测试。

Note 3: This product has undergone corresponding insulation tests before leaving the factory, and it is forbidden to conduct withstand voltage tests between phases.

注 4：AC380/400/415V 工作电压的辅助电源模块线电压取电见图 9，AC440/480V 工作电压的辅助电源模块相电压取电见图 10。

Note 4: For auxiliary power modules with AC380/400/415V working voltage, refer to Figure 9 for line voltage power supply; for auxiliary power modules with AC440/480V working voltage, refer to Figure 10 for phase voltage power supply.

注 5：合分闸时间包了含位置反馈信号输出时间。

Note 5: The combined opening and closing time includes the time for position feedback signal output.

注 6：产品合闸状态下辅助电源失电，可延时响应分闸信号；分闸状态下失电后不响应合闸信号；失电后如无控制信号输入则开关保持当前状态不动作。

Note 6: When the product is in the closed state and auxiliary power supply loses power, it can delay the response to the opening signal; when in the open state and loses power, it does not respond to the closing signal; after losing power, if there is no control signal input, the switch remains in its current state without action.

五、工作与存贮环境 Working and storage environment

5.1 温度 Temperature

产品正常工作的周围空气温度范围为-30℃～+75℃；存储温度为-40℃～+85℃；
超过 60℃时产品需降容使用，降容系数见下表。
The ambient air temperature range for normal operation of the product is from -30℃ to +75℃; storage temperatures are from -40℃ to +85℃; when the temperature exceeds 60℃, the product needs to be used with derating, and the derating coefficient can be found in the table below

温度降容系数 Temperature Coefficient of Capacity		
温度 Temperature	-30℃～+60℃	+60℃～+75℃
工作电流修正系数 Working Current Correction Factor	1	0.8

5.2 海拔 Altitude

正常安装地点的海拔高度不超过 4000 米，超过 4000 米使用时，降容系数见下表
The altitude of the normal installation site should not exceed 4,000 meters. When used above 4,000 meters, refer to the table below for derating factors

海拔降容系数 Altitude Attenuation Factor		
海拔 Altitude	≤4000	4000~5000
工作电流修正系数 Working Current Correction Factor	1	0.8

5.3 相对湿度 Relative humidity

环境温度为+40℃时，相对湿度不超过 50%，较低温度可以有较高湿度，如：+20℃时相对湿度可达 95%，对于因温度变化产生的凝霜应采取相应的措施。

六、产品外形及安装尺寸 Product outline and installation dimensions

6.1 外形尺寸 Dimension

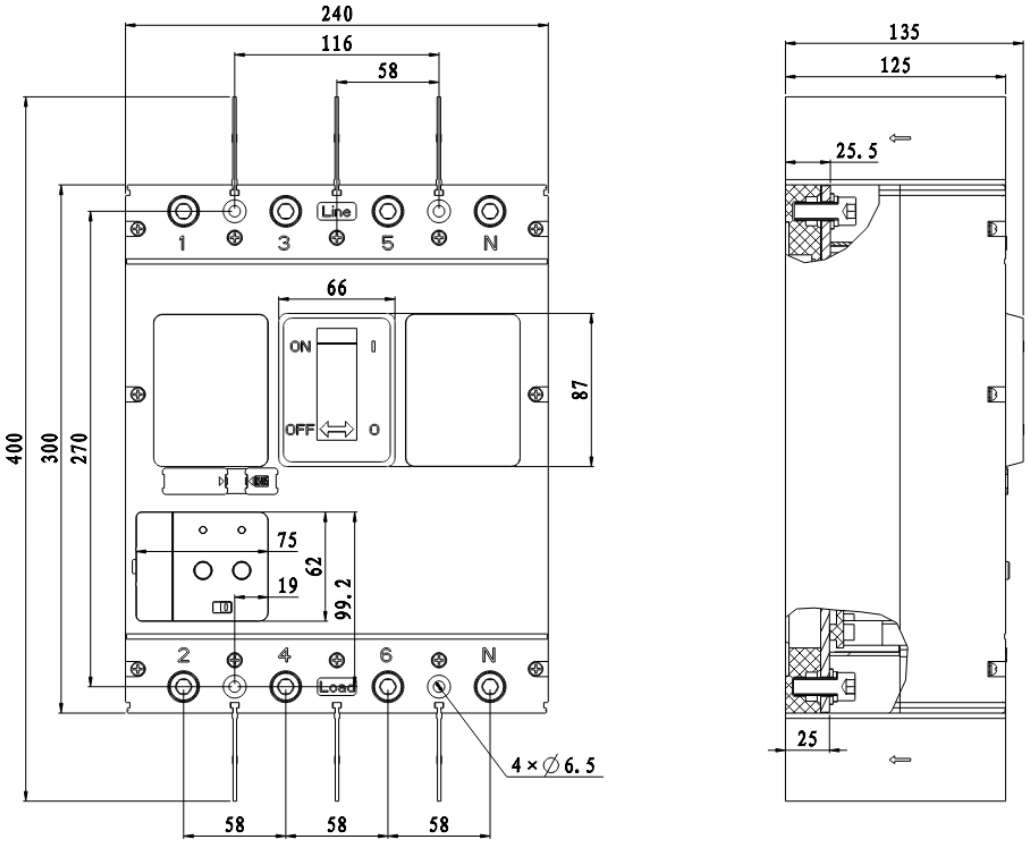


图 2. 产品外形尺寸图（单机）

Fig 2. Product Dimensional Drawing (Single Type)

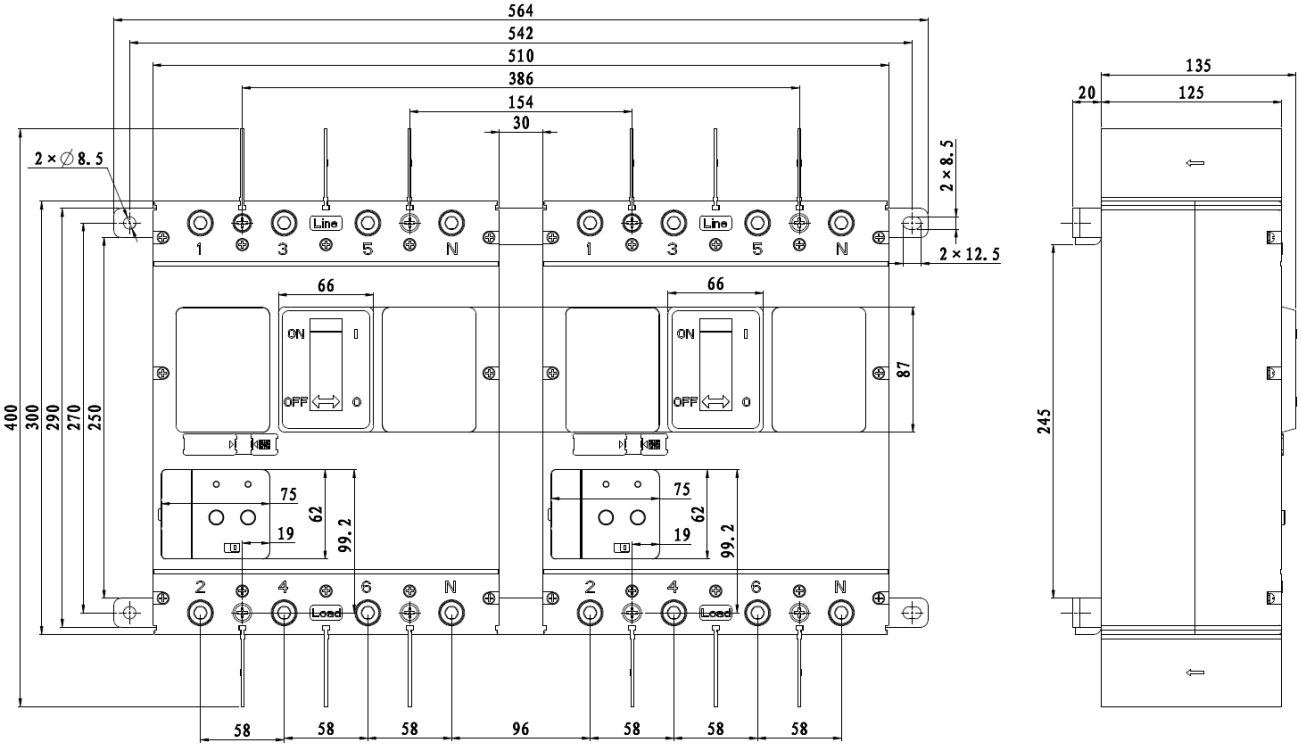


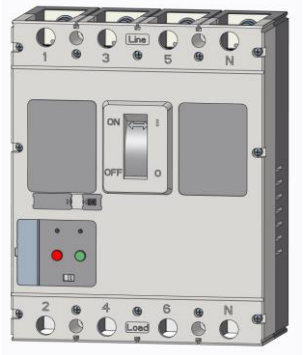
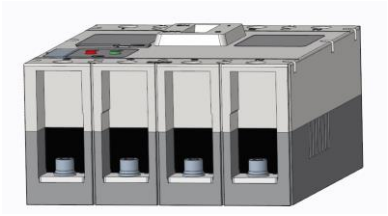
图 3. 产品外形尺寸图（并联型）

Fig 3. Product Dimensional Drawing (Parallel Type)

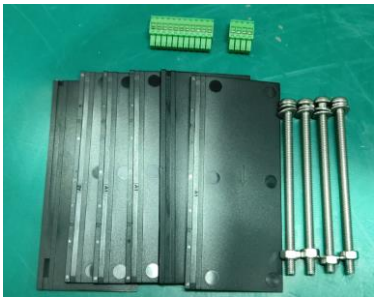
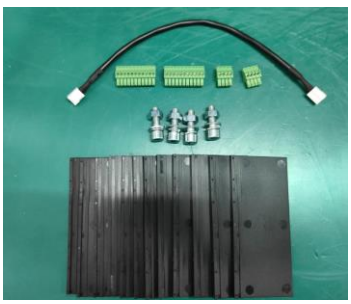
6.2 安装说明 Installation instructions

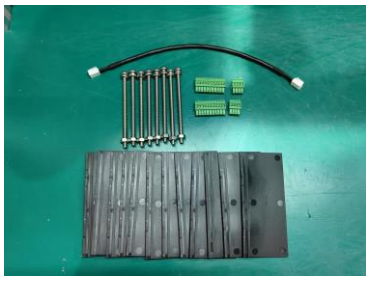
安装形式 Installation Method	螺钉底板 Screw Base Installation
整机 IP 等级 Overall IP rating	IP20
通断指示位置 Position for indicating on/off	I/O

6.3 安装方式 Installation Method

垂直安装 Vertical installation	
水平安装 Horizontal installation	

6.4 产品附件包 Product Accessory Pack

型号 Model	种类 Item	数量 Quantity	图片 Picture
单机 Single	相间隔板 Phase partition	6	
	11pin 辅助端子 auxiliary terminal	1	
	4pin 辅助端子 auxiliary terminal	1	
	M6*100 组合螺钉及螺母 assembled bolt and nut	4	
并联型 Parallel	相间隔板 Phase partition	12	
	11pin 辅助端子 auxiliary terminal	2	
	4pin 辅助端子 auxiliary terminal	2	
	M8*25 组合螺钉及螺母 assembled bolt and nut	4	
	互联线	1	

	Connection Interconnect Cable		
互锁型 interlock	相间隔板 Phase partition	12	
	11pin 辅助端子 auxiliary terminal	2	
	4pin 辅助端子 auxiliary terminal	2	
	M6*100 组合螺钉及螺母 assembled bolt and nut	8	
	互联线 Connection Interconnect Cable	1	

七、产品接线及接口定义 Product wiring and interface definition

7.1 二次接口定义 Definition of secondary circuit interface

序号 No.	定义 Definition	解释 Explaintion
1	CAN-H	CAN 通讯 CAN Communication
2	CAN-L	
3	485-A	485 通讯 485 Communication
4	485-B	
5	24Vin-1	辅助电源输入 1 Auxiliary power input 1
6	PGND	
7	PGND	辅助电源输入 2 Auxiliary power input 2
8	24Vin-2	
9	CTRL-1	远程控制干接点输入 Remote control of dry contact input
10	PGND	
11	CTRL-2	
12	ZC	过零点信号反馈 Zero crossing point Signal feedback
13	RTN1	
14	OS	分闸完成反馈注 1 Opening completed feedback note 1
15	RTN2	

注 1：指示产品主回路以及固态部分的开闭状态（固态回路的机械开闭状态不在此范围内）。

Note 1: Indicates the status of the main circuit and solid-state portion of the product (the mechanical opening and closing status of the solid-state circuit is not included)

7.2 产品控制及接线图 Product Control and Wiring Diagram

7.2.1 单机或并联模式（双干接点控制）Single-machine or parallel mode (dual dry contact control)

单机或并联模式的远程干接点控制逻辑见表 1，时序图见图 4、图 5、图 6。

The remote dry contact control logic for single or parallel modes is shown in Table 1, and the timing diagrams are presented in Fig4, Fig5, and Fig6.

CTRL-1	CTRL-2	单机产品 / 并联产品(双机同步)

		Single product / Parallel product (dual-product synchronization)
0→1	0→1	保持原状态并告警 Keep the original state and alert
0→1	0	执行合闸 Perform closing
0	0→1	执行分闸 Perform opening
0→1	1	执行合闸 Perform closing
1	0→1	执行分闸 Perform opening
0	0	保持原状态 Keep the original state
1	1	保持原状态 Keep the original state
注 1：“1”代表干接点闭合状态，即该信号与 PGND 短路；“0”代表干接点开路状态。 Note 1: "1" represents a dry contact closed state, meaning that the signal is short-circuited to PGND; "0" represents a dry contact open state. 注 2：有效的控制指令为边沿触发，非电平触发。 Note 2: Valid control instructions are edge-triggered, not level-triggered. 注 3：CTRL-1，CTRL-2 在 250us 内相继收到的干接点指令将被视为同时收到的指令组，可参照上表动作。超出 250us 间隔时间收到的指令，将被视为不同的指令组。 Note 3: When CTRL-1 and CTRL-2 receive dry contact commands within 250us, they will be considered as a simultaneous command group, which can be referred to the table above for action. Commands received beyond the 250us interval will be regarded as different command groups.		

表 1 单机/并联模式远程干接点控制逻辑

Table 1: Remote Dry Contact Control Logic for Single/Parallel Mode

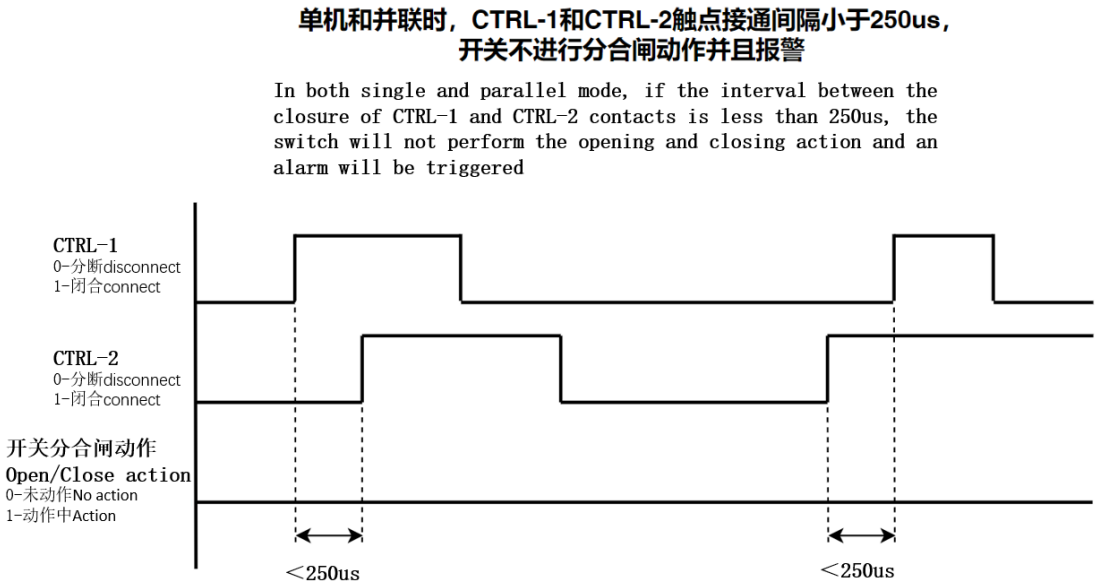


图 4. 单机/并联模式控制时序图(a)

Fig 4. Timing diagram for single-machine/parallel mode control (a)

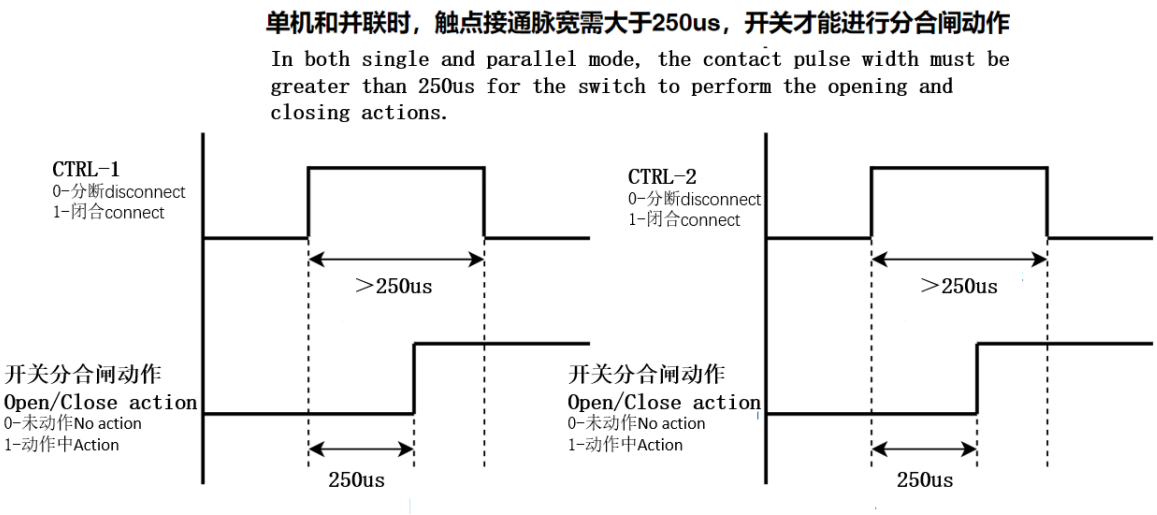


图 5. 单机/并联模式控制时序图(b)

Fig 5. Timing diagram for single-machine/parallel mode control (b)

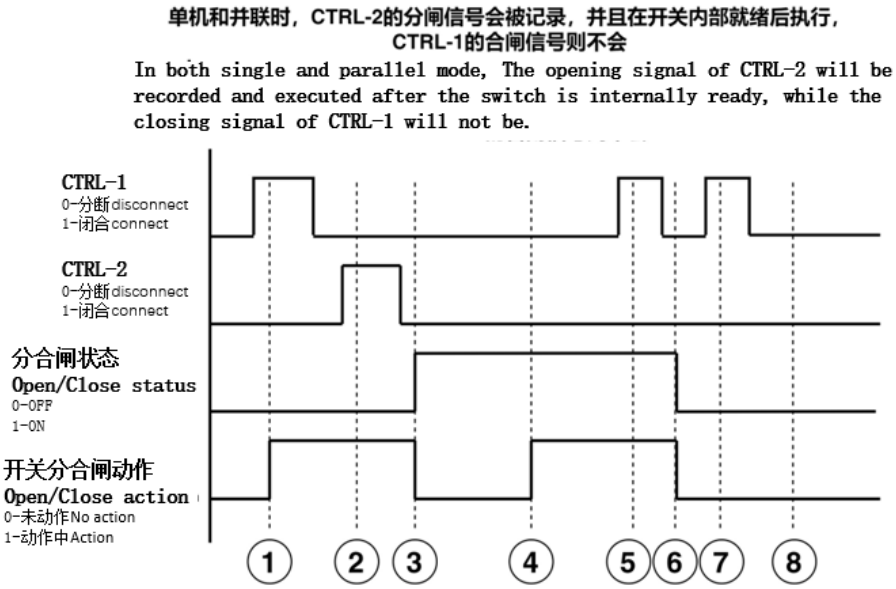


图 6. 单机/并联模式控制时序图(c)

Fig 6. Timing diagram for single-machine/parallel mode control (c)

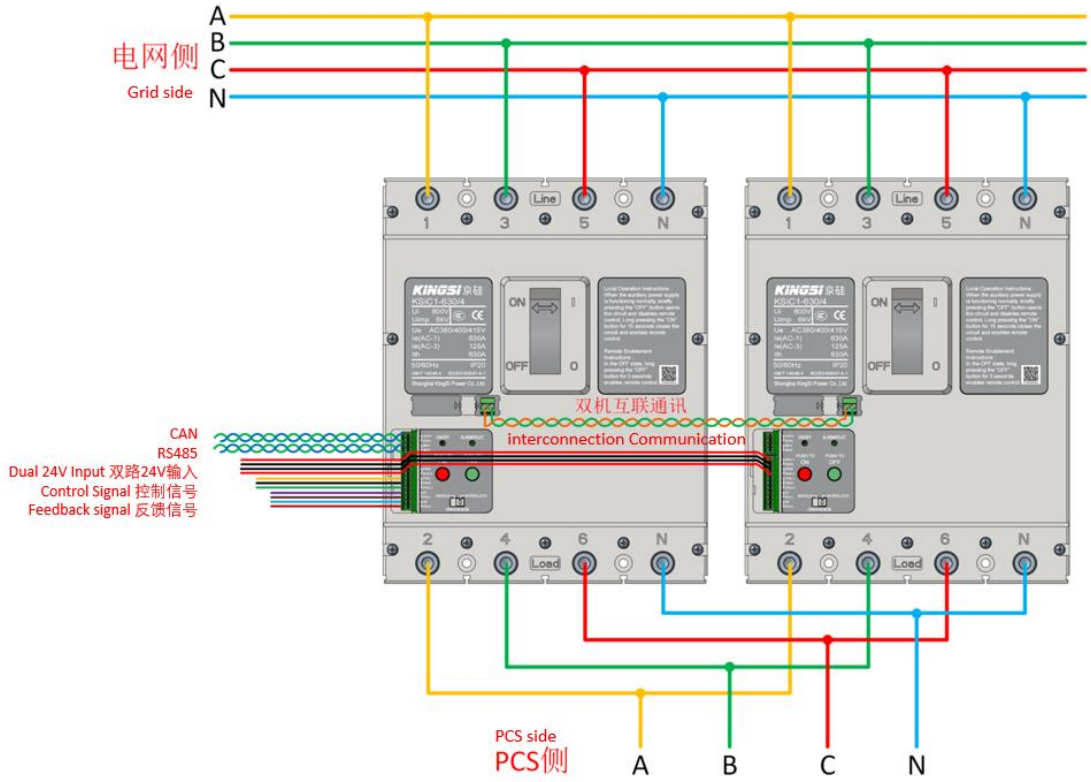


图 7. 并联型产品接线图

Fig 7. Wiring diagram for parallel type products

7.2.1.1 单干接点控制模式 Single Dry Contact Control

在单机或并联模式下，如用户只有一个控制干接点，选型时可选择单干接点模式机型（参见上文第三部分“规格型号说明”），其控制逻辑如表 2.

In single-machine or parallel mode, if the user has only one control dry contact, when selecting the model (see Section III "Specifications and Model Description" above), choose the single dry contact mode model, whose control logic is shown in Table 2.

CTRL-1	单机产品 / 并联产品(双机同步) Single product / Parallel product (dual-product synchronization)
0→1	执行分闸 Perform opening
1→0	执行合闸 Perform closing
0 or 1	保持原状态 Keep the original state
注 1：“1”代表干接点闭合状态，即该信号与 PGND 短路；“0”代表干接点开路状态。 Note 1: "1" represents a dry contact closed state, meaning that the signal is short-circuited to PGND; "0" represents a dry contact open state. 注 2：有效的控制指令为边沿触发，非电平触发。 Note 2: Valid control instructions are edge-triggered, not level-triggered.	

表 2 单机/并联模式 单干接点控制逻辑

Table 2: Single-machine/parallel mode single dry contact control logic

7.2.2 互锁模式 Interlock Mode

互锁模式下远程干接点控制逻辑见表 3

The remote dry contact control logic under the interlock mode is shown in Table 3

CTRL-1	CTRL-2	接控制信号的产品 Products receiving control signals (1#)		另一台 Another (2#)	
		产品状态 Product Status	执行动作 Perform the action	产品状态 Product Status	执行动作 Perform the action
0→1	0→1	ON/OFF	保持原状态并告警 Keep the original state and alert	ON/OFF	保持原状态并告警 Keep the original state and alert
0→1	1→0	OFF	执行合闸 Perform closing	ON	执行分闸 Perform opening
1→0	0→1	ON	执行分闸 Perform opening	OFF	执行合闸 Perform closing
0→1	0/1	OFF	不动作 No action	ON	不动作 No action
0→1	0/1	OFF	执行合闸 Perform closing	OFF	不动作 No action
0/1	0→1	ON	不动作 No action	OFF	不动作 No action
0/1	0→1	OFF	不动作 No action	OFF	执行合闸 Perform closing
1→0	0/1	ON/OFF	执行分闸 Perform opening	ON/OFF	不动作 No action
0/1	1→0	ON/OFF	不动作 No action	ON/OFF	执行分闸 Perform opening

注 1：“1”代表干接点闭合状态，即该信号与 PGND 短路；“0”代表干接点开路状态，ON 表示合闸状态，OFF 表示分闸状态；

Note 1: "1" represents a dry contact closed state, meaning that the signal is short-circuited to PGND; "0" represents a dry contact open state. ON indicates the closed state, and OFF indicates the open state.

注 2：有效的控制指令为边沿触发，非电平触发；

Note 2: Valid control instructions are edge-triggered, not level-triggered.

注 3：CTRL-1，CTRL-2 在 250us 内相继收到的干接点指令将被视为同时收到的指令组，可参照上表动作。超出 250us 间隔时间收到的指令，将被视为不同的指令组。

Note 3: When CTRL-1 and CTRL-2 receive dry contact commands within 250us, they will be considered as a simultaneous command group, which can be referred to the table above for action. Commands received beyond the 250us interval will be regarded as different command groups.

注 4：以上逻辑仅针对两台双干接电控制单机组成的互锁控制，如果两台单干接点控制机型组成互锁，控制逻辑则相反，干接点闭合开关分闸，详细说明可咨询厂家。

Note 4: The above logic only applies to interlocking control consisting of two dual-dry contact control units. If two single-dry contact control models are assembled for interlocking, the control logic is opposite, with the dry contact closing switch opening. For detailed explanations, please consult the manufacturer.

表 3 互锁模式远程干接点控制逻辑

Table 3: Interlock Mode Remote Dry Contact Control Logic

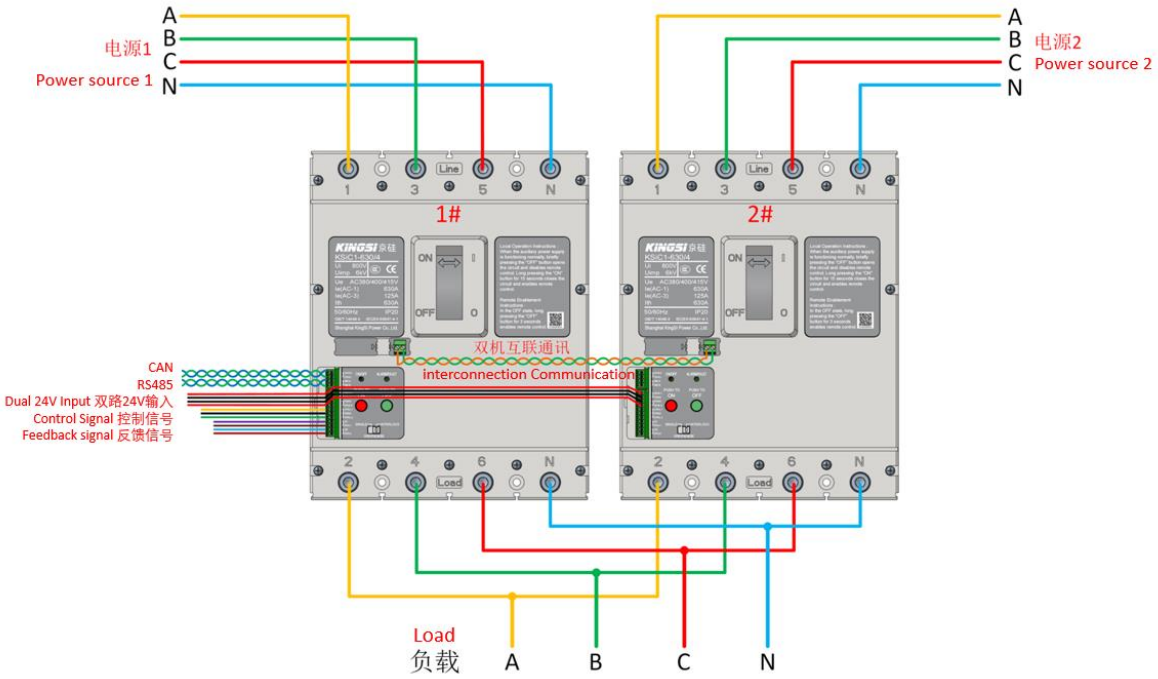


图 8. 互锁型产品接线图

Figure 8. Interlocking Product Wiring Diagram

7.2.3 外部辅助电源接线图 External Auxiliary Power Connection Diagram

单机对外部辅源的功率要求为瞬时 120W。推荐使用两个 60W 的明纬电源模块 WDR-60-24，分别接入电网侧和储能侧，24Vdc 输出分别接到产品面板上两个 24Vin-1/24Vin-2 端子。

The power requirement for a single machine to an external auxiliary source is instantaneous 120W. It is recommended to use two 60W Mean Well power modules, WDR-60-24, connected separately to the grid side and storage side, with 24Vdc outputs respectively connected to the two 24Vin-1/24Vin-2 terminals on the product panel

单机需按下图 9、图 10 配置双路 60W 辅助电源，如有稳定的不间断电源可按图 11 配置单路 120W 辅源供电。推荐外部辅助电源模块型号：明纬 EDR-120-24，该电源模块由于输入电压范围较窄仅支持进线端接 UPS 使用。

The single machine needs to be configured with a dual-path 60W auxiliary power supply as shown in Figure 9 and Figure 10. If there is a stable uninterrupted power supply such as UPS, it can be powered by a single-path 120W auxiliary source as shown in Fig 11. Recommended external auxiliary power module model: Mingwei EDR-120-24,This power supply module, due to its narrow input voltage range, only supports connection at the input end with a UPS for use.

并机或互锁组合则按单机 120W 的需求成比例配置辅助电源。

For parallel or interlocking configurations, auxiliary power is proportioned according to the demand of a single 120W machine.

辅助电源输入线按不同的额定电压选择如下不同的连接方式

The auxiliary power input line should be connected according to the following different connection methods, depending on the rated voltage

1） 额定 380/400Vac，各电源模块接入线电压（支持过欠压 65%-135%）；

Rated for 380/400 Vac, each power module connects to line voltage (supports 65%-135% Ue)；

2） 额定 415Vac，各电源模块接入线电压（支持过欠压 65%-132%）；

Rated for 415 Vac, each power module connects to line voltage (supports 65%-132% Ue);

3） 额定 480Vac，各电源模块接入相电压（支持过欠压 65%-135%）；

Rated for 415 Vac, each power module connects to phase voltage (supports 65%-135% Ue);

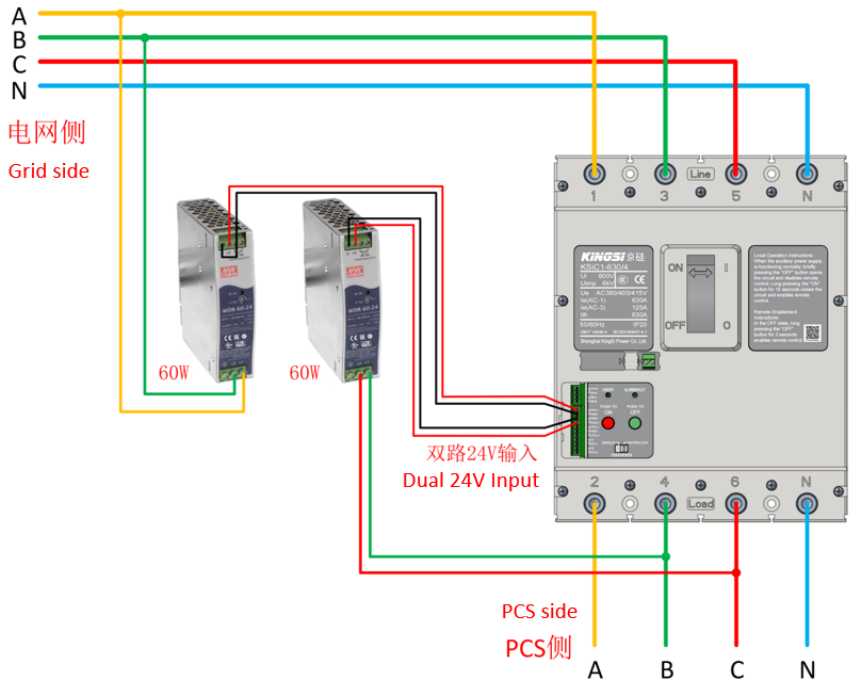


图 9. 双路辅助电源连接方式（接入线电压）

Fig 9. Dual-path auxiliary power supply connection method (access line voltage)

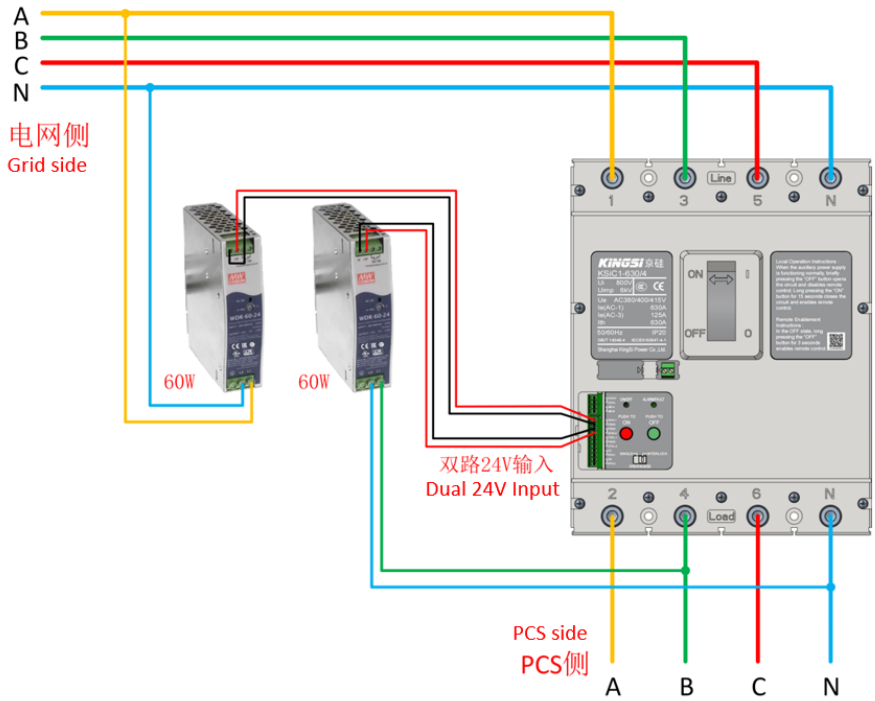


图 10. 双路辅助电源连接方式（接入相电压）

Fig 10. Dual-path auxiliary power supply connection method (accessing phase voltage)

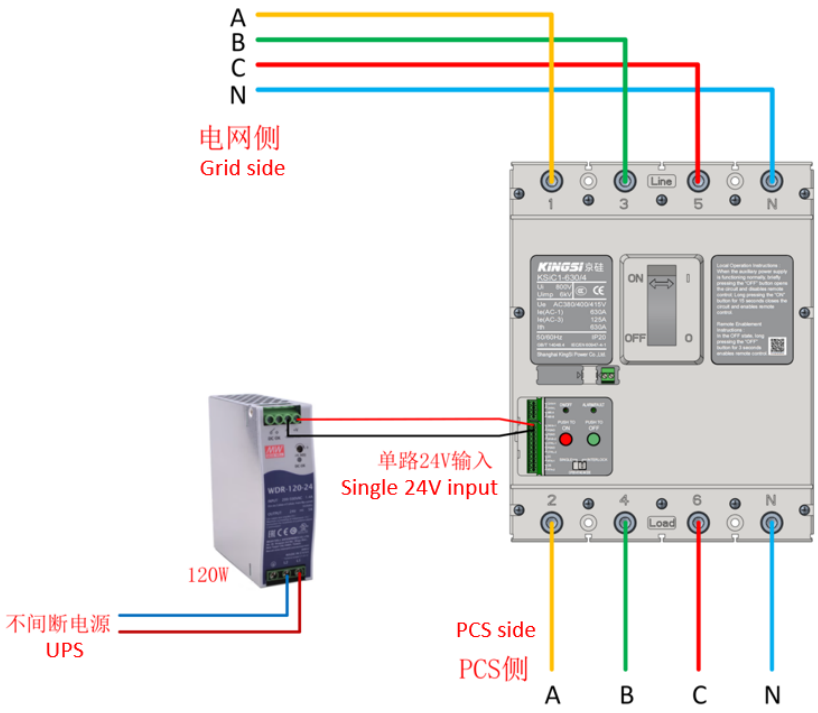


图 11. 单路辅助电源连接方式（接入不间断电源）

Fig 11. Single-line auxiliary power connection method (connection to UPS)

7.2.4 三极机型接线示意图 3 Pole Model Type Connection Diagram

前述所有接线示意图均以四极机型为例绘制。如用户选用三极机型，可不接 N 极（出厂产品 N 极已去除接线装置，只保留铜排，三极产品与四极产品外形尺寸相同），其他三极正常接线即可。图 12 是以并联机型为例的接线示意图。

All the wiring diagrams mentioned above are drawn based on a four-pole model. If users choose a three-pole model, they can leave N pole unconnected (the factory product has removed the connection device for N pole and only retains the copper bar; the three-pole products have the same dimensions as the four-pole products). The other three poles can be connected normally. Figure 12 is an example of a wiring diagram for parallel models.

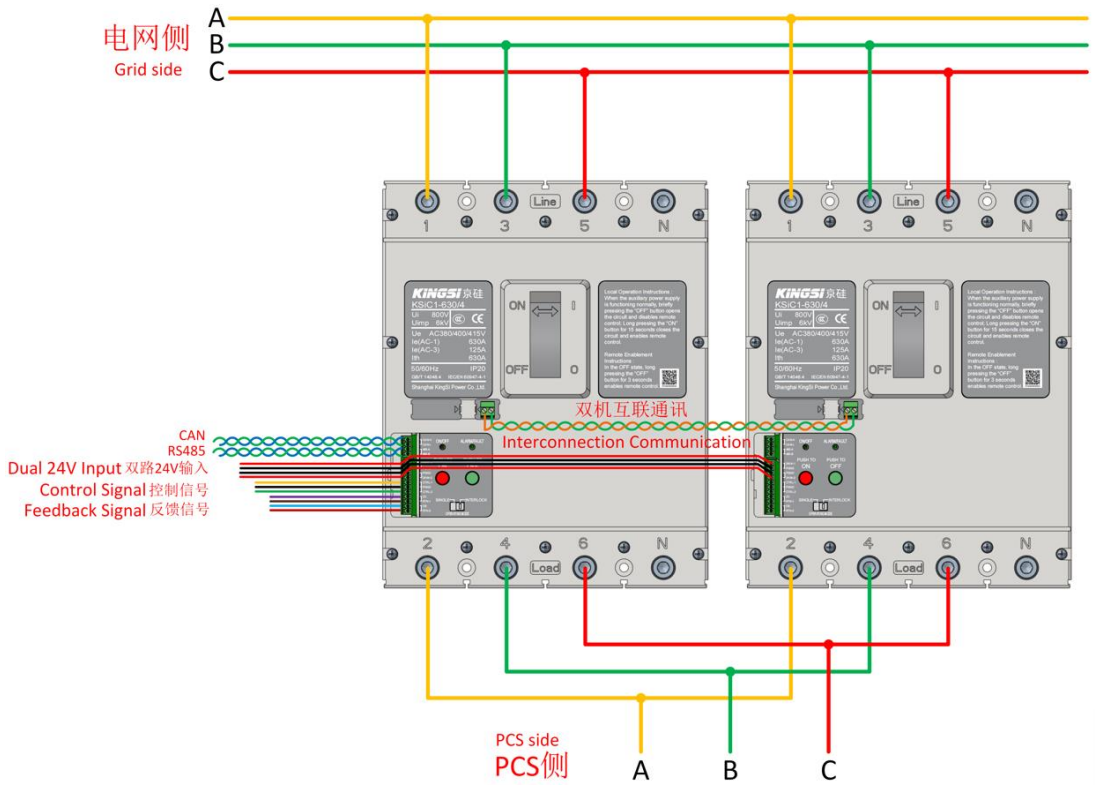


图 12. 三极产品接线示意图

Fig 11. Three-pole Product Connection Diagram

八、注意事项 Precautions

8.1 维护内容 Maintenance contents

开关维护在正常操作条件下每年一次，以下为维护内容：

Switch maintenance should be performed once a year under normal operating conditions, and the following is the maintenance content:

1）操作开关进行合闸分闸，往复操作 5 次，开关应能可靠进行合、分动作；

Operate the switch for closing and opening, repeat this operation 5 times, the switch should be able to reliably perform the closing and opening actions:

2）清除表面及连接处的灰尘（用清洁、干燥的抹布擦拭）；

Clear dust from the surface and connections (wipe with a clean, dry cloth)

3）检查所有连接情况，用砂布擦除氧化物，用可溶解剂清洁，拧紧螺栓和螺母；

Check all connections, remove oxides with sandpaper, clean with a solvent, and tighten bolts and nuts;

8.2 使用和维护 Use and maintenance

安装注意事项 Installation precautions

1）与主电路连接必须由具有专业资格的人员进行配线作业；

The wiring work connecting to the main circuit must be carried out by personnel with professional qualifications

2）确认输入和输出电源处在完全断开的情况下，才能进行配线作业；

Ensure that the input and output power are completely disconnected before performing wiring work

3）运行注意事项湿手不能操作开关，否则可能发生电击事故；

Cautionary Notes for Operation: Do not operate switches with wet hands, as this

may result in an electric shock incident.

4）推荐垂直安装使用，如水平安装，需降额使用,参考 4.1 节注 1;

It is recommended to use it in a vertical installation. If installed horizontally, it needs to be used at a reduced capacity, refer to Note 1 in Section 4.1.

5) 安装时确保每台开关两侧留有 30mm 以上间隙以供散热。

Ensure that there is a gap of more than 30mm on both sides of each switch for heat dissipation during installation.

版 本[注] Revision	日 期 Date	更新记录 Update history	起 草 Drafting	核 准 Approval
F1.0	20250410	升级为 F 版本、规格型号新增单节点控制，增加内阻规格、辅源要求、3P 接线图、单干接点控制逻辑	殷健	高旭
F1.1	20250704	增加附件包、更新产品图片	殷健	高旭

注释：

规格书版本说明

T—(Target Version) 目标版本：描述开发目标的早期规格书，内容会根据项目情况刷新。

P—(Preliminary Version) 初步版本：量产前的样机规格书，用于量产前的客户送样。

F—(Official/Formal Version) 正式版本：量产后的正式规格书，基于P版本根据实际情况迭代，量产后切为F。